AMENDMENTS TO THE DRAWINGS

Please add new figures 5 and 6.

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REMARKS

This application is a continuation of United States Patent Application Ser. No. 09/926,768, now US Patent 6,727,696. Claims 1-72 were originally filed in the parent application. In a preliminary amendment filed with the present application, claims 1-72 were canceled and new claim 73 was added. In a second preliminary amendment filed on November 5, 2004, new claims 74-99 were added.

Claims 73-99 are pending in the applications. Claims 73, 74 and 88 are independent claims. Claims 73-99 stand rejected in the referenced office action. New figures 5 and 6 have been added to illustrate the material in paragraphs [0065] – [0075] of the application. Accompanying references to the figures in amended paragraphs [0064], [0069], [0071]-[0073] make clear that no new matter has been added by Figures 5 and 6. The specifications have been amended in paragraph [0016] to provide a proper reference to figures 4-6.

The submission of Fig. 4 and the amendment to paragraph [0031] in the present application was inadvertent. These were not present in the parent application. The amendment to paragraph and the addition of Fig. 4 were made in the parent application to illustrate the thruster that was part of the originally filed claims. Confusion caused by the inclusion of Fig. 4 in the present application is regretted. If requested by the Examiner, Fig. 4 and the amendment to paragraph [0031] will be withdrawn.

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Reconsideration of the application as amended is respectfully requested. The

Examiner's rejections are addressed in substantially the same order as in the referenced

office action.

REJECTIONS UNDER 35 USC § 112

Claims 73-79 stand rejected under 35 USC §112 ¶1 as failing to comply with the

written description requirement. Applicant respectfully disagrees.

Element (a) of claim 73 reads:

"A longitudinal member for rotating a drill bit and adapted to be conveyed
in the borehole."

A drillstring is a longitudinal member for rotating a drillbit. Both a drillstring and

a drillbit are disclosed in paragraph [0017] of the application. A drillstring rotating a

drillbit has been standard practice for at least seventy five years. Applicant doubts that

the examiner is contending that at the time the application was filed, the inventors did not

have possession of this element of claim 1.

Element (b) of claim 73 reads:

"formation evaluation sensor on said longitudinal member for making
measurements indicative of at least one of (A) a lithology of the
formation, and, (B) a fluid content of the formation."

Support for this is found, for example, in paragraph [0025]. Formation evaluation

sensors for determination of lithology and fluid content have been known in wireline

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technology of many decades and have been used in the context of MWD.

One point of novelty of claim 73 is element (c):

"an expert system for determining from said measurements of the formation
evaluation sensor at least one of (C) the lithology of the formation, and,
(D) the fluid content of the formation."

This is adequately described in paragraphs [0040], and [0067] – [0073] of the application

as originally filed. The Examiner is incorrect in presuming (¶ 3 of the office action) that

Fig. 4 depicts "the invention." The novel part of the claimed invention of claim 73 is in

paragraphs [0040] and [0067]-[0073] of the application as originally filed and Fig. 4 is in

no way relevant to 73(c).

Accordingly, applicant respectfully submits that applicant was in possession of the

claimed invention of claim 73 not only as of the filing date of the present application, but

also as of the filing date of the parent application, i.e., August 13, 2001. In addition,

applicant was also in possession of the invention of independent claims 74 and 84 for the

same reasons that the applicant was in possession of the invention of claim 73 as of the

filing date of the invention.

The Examiner has objected to the drawings for not showing every feature of the

claimed invention. Figures 5 and 6 have been added to illustrate material that is clearly

discussed in paragraphs [0064] –[0073] of the application.

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REJECTIONS UNDER 35 USC § 102

Claims 73-99 stand rejected under 35 USC § 102(e) over *Speir* (US6,624,629). Claims 73, 74 and 84 are independent claims.

As the Examiner has noted, *Speier* teaches many of the elements of claim 73. However, the Examiner is incorrect in stating that "The method of Fig. 3 (see for example lines 47-61 col 4) can be reasonably described as performed by an expert system. The expert system controls RF pulse parameters such as pulse width. Such control or optimization is dependent upon measurement results." While the operations described therein could be done by an expert system, there is no teaching or suggestion that they are.

It appears that the Examiner is unfamiliar with this term of art and a brief digression is worthwhile. Expert Systems are generally considered to be in the field of AI (Artificial Intelligence). This is a well developed field, and the following excerpt from PCAI is helpful in understanding the term.

> "Knowledge-based expert systems, or simply expert systems, use human knowledge to solve problems that normally would require human intelligence. These expert systems represent the expertise knowledge as data or rules within the computer. These rules and data can be called upon when needed to solve problems. Books and manuals have a tremendous amount of knowledge but a human has to read and interpret the knowledge for it to be used. Conventional computer programs perform tasks using conventional decision-making logic -- containing little knowledge other than the basic algorithm for solving that specific problem and the necessary boundary conditions. This program knowledge is often embedded as part of the programming code, so that as the knowledge changes, the program has to be changed and then rebuilt. Knowledge-based systems collect the small fragments of human know-how into a knowledge-base which is used to reason through a problem, using the knowledge that is appropriate. A different problem, within the domain of the knowledge-base, can be solved using the same program without reprogramming. The ability of these system to explain the

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reasoning process through back-traces and to handle levels of confidence and uncertainty provides an additional feature that conventional programming don't handle." (emphasis added).

Material from the PCAI website was submitted in an IDS filed with the application. A tutorial from the IEEE Computer Journal is also being submitted in a Supplementary IDS accompanying this document to provide additional information to the Examiner regarding the field of expert systems. The advantage of Expert Systems is in the highlighted portion of the quotation above, namely, avoiding the necessity for reprogramming a computer algorithm. The use of the Expert System is described in the present application in paragraphs [0064] - [0075]. Preferably, the Expert System of the present invention is implemented using a Neural Networks (NN). In one embodiment of the invention, more than one NN is used. A first NN is used for determination of lithology and formation fluid type from formation property measurements. A second NN is used for modifying the NMR acquisition and processing parameters based upon the knowledge of the lithology and fluid type and the drilling conditions.

The three main steps in a NN implementation are summarized in [0075]. They are:

1. Training

2. Validation, and

3. Processing.

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Also, as noted in [0075], the Neural Net implementation is preferably carried out using a well established software package in the SNNS (Stüttgart Neural Net Simulator), some information about which was provided in the IDS filed with the application.

Examples of NN implementation of processing of logging data are given in, for example, US Patent 6,381,542 to *Zhang* et al.

Applicant respectfully submits that a careful reading of *Speier* shows no teaching or suggestion of the use of an expert system. Applicant respectfully disagrees with the Examiner's contention that "the method of Fig. 3 (see for example lines 46-61 col. 4) can be reasonably described as performed by an expert system." What is shown in Fig. 3 and discussed at col. 4 lines 46-61 is merely a conventional flow chart using preprogrammed methods for determining properties of the formation and automatically finding the optimal pulse width. Applicant draws the attention of the Examiner to the difference between the teachings of *Speier* (a conventional computer program using conventional decision making logic) and the claimed invention which uses human knowledge to structure the expert system.

A fee of $180.00 is believed to be due for the supplementary IDS. The Commissioner is hereby authorized to charge this and any deficiency. and credit any surplus to **Deposit Account 02-0429 (414-26579-USC)**

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Respectfully submitted

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